MERIT RESEARCH JOURNALS
www.meritresearchjournals.org

Merit Research Journal of Environmental Science and Toxicology Vol. 1(3) pp. 066-070, May, 2013
Available online http://www.meritresearchjournals.org/est/index.htm


*Full Length Research Paper*

# Parasitic survey of clam (*Galatea paradoxa*) from two locations in Southern Ijaw Local Government Area of Bayelsa State, Nigeria

**Adeyemo Abiodun Oluseye*[1], Onuha Goodluck[1] and Inyang Iniobong[2]**

[1]Department of Fisheries Technology, Faculty of Agricultural Technology, Niger Delta University.Wilberforce Island. P. M. B. 071. Yenagoa. Bayelsa State.
[2]Department of Biological Science,Faculty of Science, Niger Delta University.Wilberforce Island. P. M. B. 071. Yenagoa. Bayelsa State.

Accepted March 05, 2013

**Parasitic surveillance of freshwater clam (*Galatea paradoxa*) was carried out between March to April 2012 at Eniwari and Oporoma in Southern Ijaw Local Government area of Bayelsa State. Clams were collected and transported to the laboratory for measurements of weight, length and width. Parasites were examined and attempt was made on the identification using appropriate keys. The result of the study showed that the parasitic prevalence was 60% and 55% at Eniwari and Oporoma respectively. The prevalence of the parasites found were Protozoans (6.7%), Trematodes (8.3%), Nematodes (38.3%) and Cestodes (6.7%) at Eniwari, while at Oporoma the prevalence of parasites found were Protozoans (1.7%), Trematodes (10%), Nematodes (35%) and Cestodes (8.3%), the nematodes had the highest prevalence. The rate of parasitic infection according to analysis of weight, length and width varied within and among the group .The weight range of clam between131-190cm recorded the highest infection rate in the two locations. Infection seemed to be higher in the medium sized clams than in the small or big sized clams.**

**Keywords:** Clam, parasites, infection, prevalence, bivalve.

## INTRODUCTION

Molluscs can accumulate micro-organisms including pathogens from the water environment, they are filter feeding organisms and can concentrate bacteria in high number and the number of micro-organism present in the water depend on anthropogenic factors. Study of bivalve Parasite by Bower *et al.* (1994), had shown that each 1ollusk group becomes infected by a similar array of organisms from viruses to copepods, although relatively few cause disease. Clam mussels, scallops, and oysters have been harvested commercially for many centuries, and have undoubtedly suffered from disease causing mortalities throughout the time. The study of bivalve parasite, disease, and defense mechanism is relatively recent, and was driven largely by epizootics mortality of oysters in the United State and Europe in the last half

*Corresponding Author Email: text2abiodun@yahoo.com Mobile :234-8037394321.

**Plate 1.** Samples of *Galatea paradoxa*


**Figure 1.** Map of Niger Delta of Nigeria showing the location of Eniwari and Oporoma. (arrowed)

**Source:** Encarta Premium World Map. 2009

century (Ford and Tripp, 1996). Larval cestodes infect hard clam in Gulf of Mexico and heavily reduce meat condition as observed by Cake (1977). Historically, fresh water clams provided food for early man and native Nigeria, also in Ghana and Cameroon there is strong economic incentive derived from the harvest of these bivalves (Adjei-Boateng et al., 2009).

The objectives of this study were therefore to estimate the level of parasitic contamination in fresh water Clam *(Galatea paradoxa). D*etermine the intensity of parasite and identify parasites found on Clams from the two locations: Oporoma and Eniwari in Southern Ijaw Local Government Area of Bayelsa State.

## MATERIALS AND METHODS

Samples of clam *Galatea paradoxa (plate 1)* were collected for parasitic examination from two locations Oporoma (Latitude $4^{o}$ $48^{l}$ N, Longitude $6^{o}$ $05^{l}$ E) and Eniwari (Latitude $4^{o}$ $45^{l}$N, Longitude $6^{o}07^{l}$ E) communities on the tributary of River Nun in Bayelsa State. The sample size used was according to the calculations of OIE (2011) at 5% prevalent level and 95% confidence limit. Sixty samples each of *G. paradoxa* were collected from the two sampling locations and transported to the laboratory. Measurement of weight, length and width were taken for each clam which was then examined externally with magnifying lens. Shells were carefully opened to examine the flesh, intestine and gills. Body fluid and the squash preparations of organs were fixed in 10% formol saline. Visible parasites were identified using the keys of Lom and Dykova (1991). The drops of body fluid and smears from squash preparations were stained with parasitology iodine and observed under the 40x magnification of a binocular microscope. Parasites identified were recorded

**Table 1.** Rate of parasitic infection of Clam according to weight.

| Range (g) | No Examined | | No Infected | | % Infected Within Group | | % Infected Among Group | |
|---|---|---|---|---|---|---|---|---|
| | EN | OP | EN | OP | EN | OP | EN | OP |
| 40-70 | - | 2 | - | 2 | - | 100 | - | 3.3 |
| 71-100 | 3 | 4 | 2 | 2 | 66.6 | 50 | 3.3 | 3.3 |
| 101-130 | 9 | 7 | 8 | 5 | 88.8 | 57.1 | 13.3 | 8.3 |
| 131-160 | 24 | 11 | 16 | 3 | 66.6 | 27.2 | 26.6 | 5 |
| 161-190 | 19 | 18 | 10 | 11 | 52.6 | 61.1 | 16.6 | 18.3 |
| 191-220 | 1 | 7 | - | 5 | - | 57.1 | - | 8.3 |
| 221-250 | - | 9 | - | 5 | - | 44.4 | - | 8.3 |
| Total | 60 | 60 | 36 | 33 | | | | |

**Table 2.** Rate of parasitic infection in clam according to length.

| Range (cm) | No Examined | | No Infected | | % Infected Within Group | | % Infected Among Group | |
|---|---|---|---|---|---|---|---|---|
| | EN | OP | EN | OP | EN | OP | EN | OP |
| 5-6-5 | 21 | 17 | 13 | 11 | 61.91 | 64.7 | 21.67 | 18.3 |
| 6.6-7.5 | 34 | 30 | 21 | 14 | 61.76 | 46.7 | 35 | 23.3 |
| 7.6-8.5 | 5 | 10 | 2 | 7 | 40 | 70 | 3.33 | 11.7 |
| 8.6-9.5 | - | 2 | - | 1 | - | 50 | - | 1.6 |
| Total | 60 | **60** | 36 | **33** | | | | |

**Table 3.** The rate of parasitic infection in clam according to the width.

| Range (cm) | No Examined | | No Infected | | % Infected Within Group | | % Infected Among Group | |
|---|---|---|---|---|---|---|---|---|
| | EN | OP | EN | OP | EN | OP | EN | OP |
| 7.0-8.0 | 8 | 4 | 4 | 3 | 50 | 75 | 6.67 | 5.0 |
| 8.1-9.0 | 31 | 11 | 22 | 9 | 70.96 | 81.8 | 36.67 | 15 |
| 9.1-10.0 | 19 | 33 | 9 | 20 | 47.3 | 60.6 | 15 | 33.3 |
| 10.1-10.5 | 2 | 12 | 1 | 1 | 50 | 8.3 | 1.67 | 1.6 |
| **Total** | **60** | **60** | **36** | **33** | | | | |

according to each specimen.

## Data analysis

Parasitological indices according to Margolis, *et al* (1982) were used to describe the parasitic infection. The rate of parasitic infection was analysed according to the size of clam length, weight and width. Parameters of parasitic infection were calculated thus:

**1.** $\Pr evalence = \frac{Number\ Infected}{Number\ exa\min ed} x100$

**2.** $Intensity = \frac{Number\ of\ parasite\ found}{Number\ of\ Clam\ \inf ected}$

**3.** $Aboundance = \frac{Number\ of\ parasite\ found}{Number\ of\ clam\ exa\min ed}$

A comparative analysis was done for the Clams at the two locations

## RESULTS

The rate of infection on clams in the two locations were shown in Table 1 according to weight while the weight range of 131-160g clams recorded highest percentage of infection at Eniwari it was the weight range of 161-190g that had the highest infection at Oporoma. In Oporoma the average weight of clams was 164.69± 36.51g with the average length of 7.54± 0.69cm and width of

**Table 4.** Comparative analysis of parasitic infection of clam at Eniwari and Oporoma in Bayelsa State.

| | Eniwari | Oporoma |
|---|---|---|
| Weight | 147.65 ± 21.51 | 164.69 ± 36.51 |
| Length | 6.84 ± 0.48 | 7.63 ± 0.69 |
| Width | 9.03 ± 0.51 | 9.23 ± 0.92 |
| Prevalence % | 60 | 55 |
| Intensity | 1 | 1.09 |
| Abundance | 0.6 | 0.6 |

**Table 5.** Prevalence of parasites found on clam (*Galatea paradoxa) at E*niwari and Oporoma sites.

| Parasites | | Eniwari | | Oporoma | |
|---|---|---|---|---|---|
| **Class** | **Genus** | **Number Found** | **Prevalence %** | **Number Found** | **Prevalence %** |
| Protozoan | Unspecified | 4 | 6.7 | 1 | 1.7 |
| Trematode | Unspecified | 5 | 8.3 | 6 | 10 |
| Nematode | *Oxyuridae sp* | 23 | 38.3 | 21 | 35 |
| Cestode | Unspecified | 4 | 6.7 | 5 | 8.3 |

**Plate 2.** Cestode

**Plate 3.** Trematode

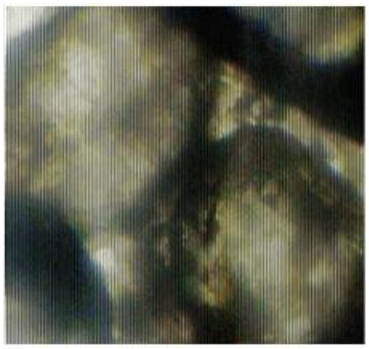

**Plate 4.** Protozoan

**Plate 5.** Oxyuridae nematodes

9.23±0.92cm , while the average weight of clams in Eniwari was 147.65 ± 21.51g with the average length of 6.84± 0.48cm and width of 9.03±0.51cm as shown in Table 4. The parasitic prevalence of clams at Eniwari was 60% while at Oporoma the parasitic prevalence level was 55%, the abundance of parasitic infection on clams at the

two locations was the same as shown in Table 4. The parasites found were not identified to specific level due to limited facilities but the nematode that recorded the highest number at the two locations was keyed down to Oxyuridae family as shown in Table 5 and Plate 2 (Trematode), Plate 3 (Cestode), Plate 4 (Protozoan) and Plate 5 (Nematode).

## DISCUSSION

The number of nematode parasites found at the two sites suggested the prominence of these nematodes in clams in these locations 38.3% and 35% prevalence at Eniwari and Oporoma respectively .This was confirmed per communication with consumers in the area claiming a more or less commensal occurrence of the parasite with the clam. Hence, this claim requires further research. Occurrence of trematode in clams was also reported by Ngo and Choi, 2004; Duangduen, *et al* 2008, they reported that high number of trematodes may affect reproductive processes, possibly retarding gonadal development. Gangloff, *et al* 2008, also used regression models to support that parasites are more important predictors of mussels reproductive effort and physiological conditions and suggesting that parasites are not actually benign commensal inhabitants of freshwater mussels as opposed to early studies, for instance Mitchell(1955). Although, Gangloff ,*et a*l (2008) found that mite and trematode abundance were greater in smaller freshwater mussels, but in this study the sizes of clams in relation to infection at these two locations varied and requires further analysis before it can be concluded that clams at Oporoma are bigger than clams at Eniwari or that smaller clams are more infected than bigger clams. Porter(1964) found that ninety-three percent of the clam examined in North Carolina coast contained only one worm *Malaclobdella grossa,*but noted that multiple infestations occurred primarily during the recruitment period. Parasites not only cause growth and reproductive difficulty in clams, it is also a cause for concern on the part of the consumers. Since mollusks are filter feeders, they concentrate contaminants to a much high level than that of the surrounding water. In fact, the main hazards associated with the consumption of shell fish arise from the micro-biological contamination of waters in which they grow, especially when the bivalve mollusks are intended to be eaten raw. But any visible parasite can easily be removed and does not render the flesh unfit for consumption. Contamination with bacteria and virus in growing area therefore determines the processing that the shell fish need to undergo in order to remove or reduce the risks from the sources before consumption. Enlightenment programme on public health information on proper handling and processing of fresh water clam should be encouraged along with other public health instructions. There should also be provision of depuration facilities at the site of collection by the operators and they must ensure that the depurated clams are not re-contaminated. Further study on the parasitic incidence on clam in this area should continue because the collection, sales and consumption contribute to the livelihood of the community.

## REFERENCES


Adjei-Boateng,D;Amisah, S. and Quagrainie, K.K. (2009) Bacteriological Contamination of the Freshwater clam (Galatea paradoxa) from the Volta Estuary, Ghana. Afr. J. Microbiol. Res. Vol 3(7): 396-399

Bower SM, McGladdery SE, Price IM (1994). Synopsis of Infectious Disease and Parasites of Commercially Exploited Shellfish. Annu. Rev. Fish Dis., 4: 1-200

Cake EW (1977). *Larval Cestode Parasites of Edible Mollusks of the Northeastern Gulf of Mexico*. Gulf Res. Rep., 6: 1-8

Duangduen K, Sirilak C, Namfon P, Napatsorn N, Wivitchuta D (2008). Buchephalid (Gasterostome) Cercariae obtained from Freshwater Clam in Thailand. J. Tropical Med. Parasitol. 36:70-76

Ford SE, Tripp MR (1996). *Diseases and defense Mechanisms in. R.I.E. Newel, V.S Kennedy and A.F. Eble (Eds.*), the Eastern oyster crassostrea Virginica. Marryland sea Grant college, park, Mp, pp. 383-450.

Gangloff MM, Lenertz KK, Feminella JW (2008). Parasitic mite and Trematode abundance are associated with reduced reproductive outputand physiological condition of Fresh water Mussels.Hyrobiologia.DOI10.1007/s/0750-008-9419-8.Springer Science

Lom J, Dykova I (1991). Parasitic Diseases In Diagnotic, Prevention and Therapy of Fish Diseases and Intoxication.SvobodovaZ. and Vykusova, B. (Editors) FAO Training Manual. Fisheries and Aquaculture Dept. FAO. Rome. ISBN 80-90-901087-0-9

Mitchell RD (1955). Anatomy, life history and Evolution of the mites parasitizing fresh water mussels. Miscellaneous Publications. Museum of Zoology. University of Michigan. No 89.

Ngo TTT, Choi KS (2004). Seasonal Changes of Perkinsus and Cercaria infections in the Manilla clam Ruditapes philippinarum from Jeju, Korea. Aquaculture239: 57-68.

OIE (2011). World Organisation for Animal Health (Office International des Epizooties).Aquatic Animal Health Code 2011 Regulations